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Soybean Cyst Nematode
(Yellow Dwarf Disease of Soybean)

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Soybean Cyst Nematode (Heterodera glycines) was detected for the first time in Florida in a soybean field in Escambia County in August, 1967. This is a nematode pest of major economic importance and the only nematode pest under Federal quarantine regulations.

History: The disease was first noted in Shirakawa, Japan, in 1915. In 1955 it appeared in North Carolina.

Geographic Range: In Asia it has been reported from Japan, Korea and Manchuria. In the United States it has been reported from Arkansas, Florida, Illinois, Kentucky, Mississippi, Missouri, North Carolina, Tennessee, Virginia, and Louisiana.

Host Range: Over 500 host plants have been reported parasitized by this nematode. Additionally, an intensive screening and testing program has established that over 500 plants are non-hosts and are not parasitized by this nematode.

Symptoms: PLANT: Unthriftiness, stunting (Fig. 1), yellowing progressing from lower leaves, death. LEAVES: Leaf drop, yellowing, reduction in size. FLOWERS: Reduced flower size and production. BEANS: Reduced size and production (Fig. 2). ROOTS: Many lateral roots, reduced root nodulation and root rot.

Damage: Cell damage within the root is evident 2-6 days after the nematode enters the root. Giant cells appear 14 days after planting. This nematode can totally destroy a crop of soybeans. Healthy plants produce about 38 pods while infested plants produce 2.4 to 10.7 pods per plant. A small infestation in a field will spread throughout the entire field in two or three years. Severest damage occurs in soil with little organic matter present.

Life Cycle of the Nematode: One generation takes 25 to 30 days. Second stage larvae emerge from cysts and remain in soil or water several weeks. The lateral portion of a small host rootlet is entered by the larvae which feeds for several days and then molts. The young female body bursts out of the root, and after a short time 200 to 450 eggs are laid in a gelatinous envelope adhering to the posterior of the female (Fig. 3). Females change from pearl white, to yellow, to brown. After the female containing 95 to 478 eggs dies, her body becomes a tough protective cyst. The eggs protected by the female's dead body remain viable several years.

Depth: Highest populations of the pest are from three to six inches deep in the soil. However, cysts have been found $3\frac{1}{2}$ feet deep in soil and larvae have been found in roots as deep as $5\frac{1}{2}$ feet.

Longevity: Investigations have shown soybean cyst nematodes survived four years in fumigated, fallow fields. None were found alive after five years.

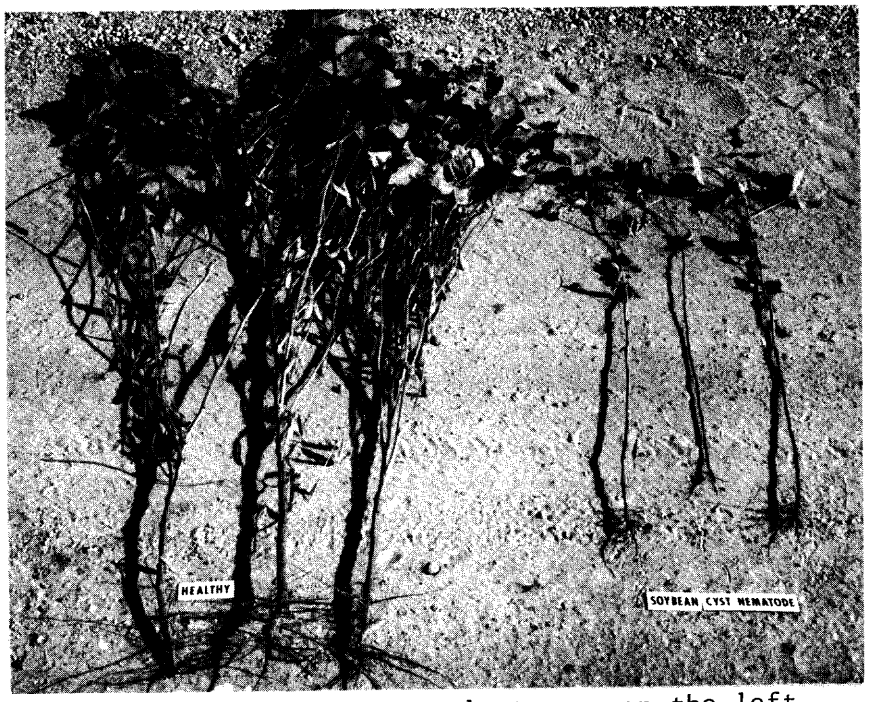

Fig. 1 Healthy soybean plants are on the left soybean infested plants on the right

Temperature: Development occurs at temperatures between 10C and 38C. Optimum development occured at 31C. Cysts held at -40C for seven months still contained viable eggs.

Dissemination: The nematodes migrate a few feet each year in the soil. Farm implements and vehicles move the nematodes into new localities. An average of 4,156 cysts were taken per pound of soil removed from combines used to harvest infested fields. Man, animals, wind and floods also spread the pest into new areas.

CONTROL

Hot Water: Nematodes were eradicated from roots dipped in hot water for thirty minutes at 48-49C.

Chemical: Eradication of the pest has been achieved by placing infested materials in covered chambers and using methyl bromide at eight pounds per 1000 cubic feet for two hours at 60 F. Nematocides such as DD, Telone, and Nemagon have been used at high rates in infested fields. Populations of the pest have been reduced temporarily by such treatments but never eradicated. Field application of methyl bromide at nine pounds per 100 square feet also failed to eradicate the nematode. The pest has been eradicated from roots by immersing the roots in a 2530 ppm Cynem (Zinophos) solution for 30 minutes.

Cultural: Fertilization programs have increased the crop and the pest. Crop rotation with or without soil fumigation has reduced but not eliminated the pest. Some resistant soybean varieties have been developed some of which are poor crop choices. Due to the fact that the soybean cyst nematode populations contain both morphological and physiological races makes production of a resistant plant difficult.

Sanitation Procedures: 1) Bulb crops harvested from infested fields should be disinfected. 2) Root crops grown in infested soil should be washed thoroughly. 3) The same container used in harvesting should not be used in marketing. 4) Machinery, tools, and vehicles used in infested fields should be disinfected. 5)Hosts of the soybean cyst nematode should not be grown on or adjacent to infested fields.

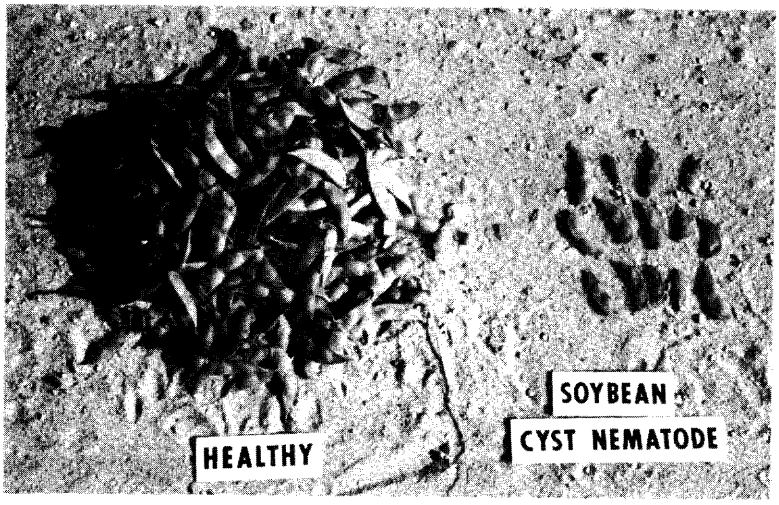

Fig. 2 Bean yield from 3 healthy soybean plants on the left, yield from 3 infested soybean plants on the right.

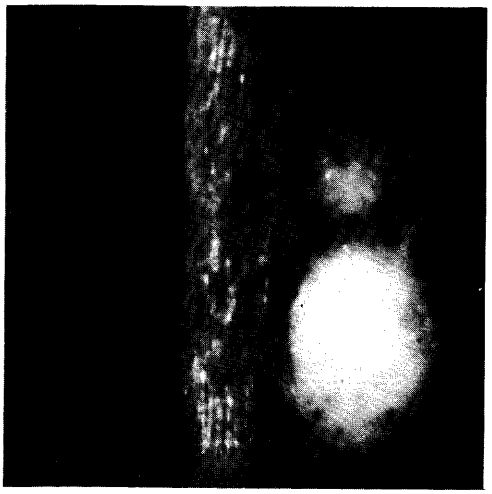

Fig. 3 A white female with egg mass.